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McGinn et al.

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(54) **STUMP REMOVER**

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Related U.S. Application Data

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A01G 23/06 (2006.01)

(52) **U.S. Cl.**
CPC ***A01G 23/065*** (2013.01)

(58) **Field of Classification Search**
CPC A01G 23/06; A01G 23/062; A01G 23/065; A01G 23/067
USPC 144/24.12
See application file for complete search history.

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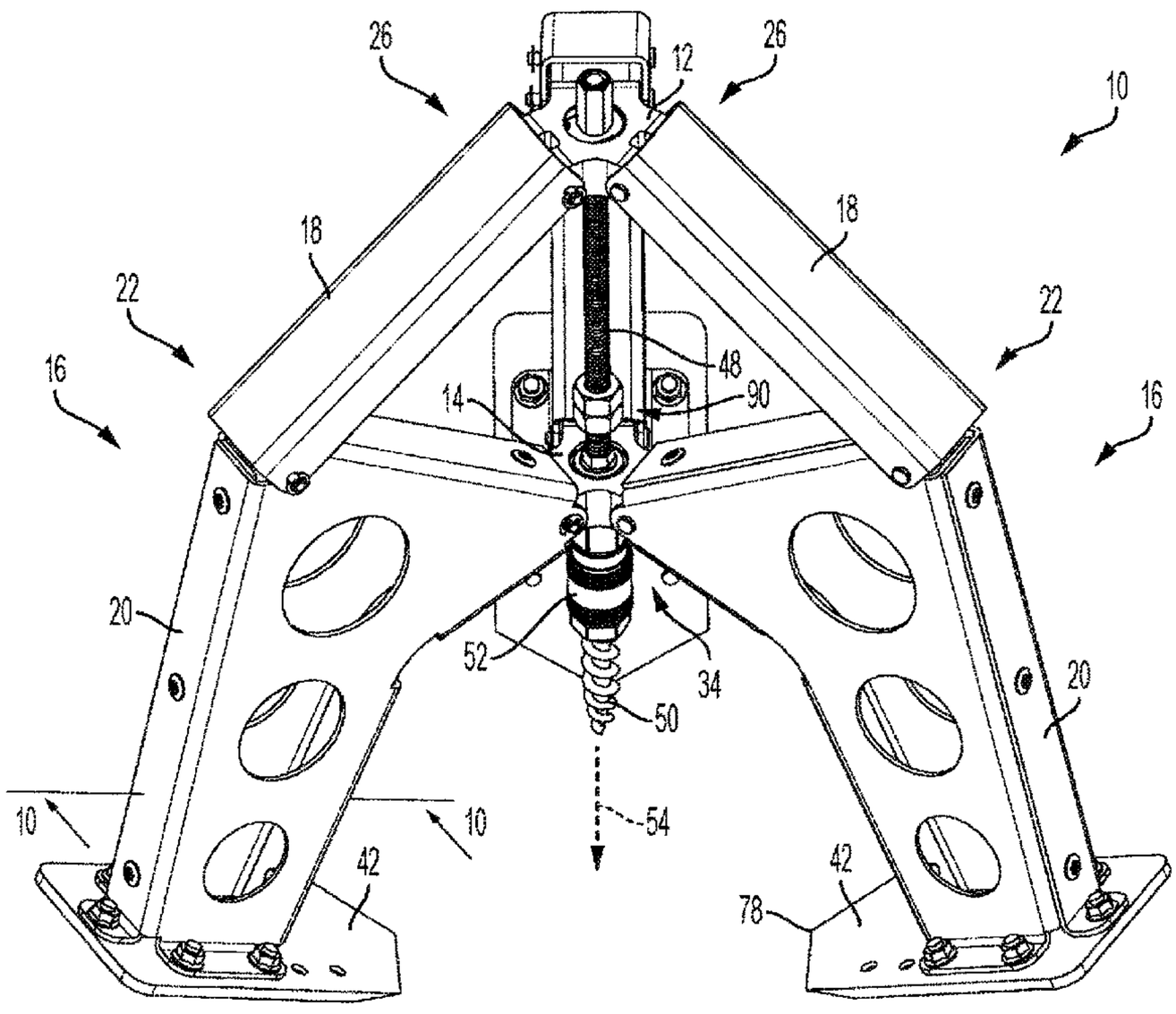
(57) **ABSTRACT**

A stump removal tool operable to sever a tree stump. The stump removal tool including an anchor fixedly couplable to the stump, and a cutting assembly adjustable between a closed position and an open position, and where the cutting assembly is removably couplable to the anchor.

20 Claims, 9 Drawing Sheets



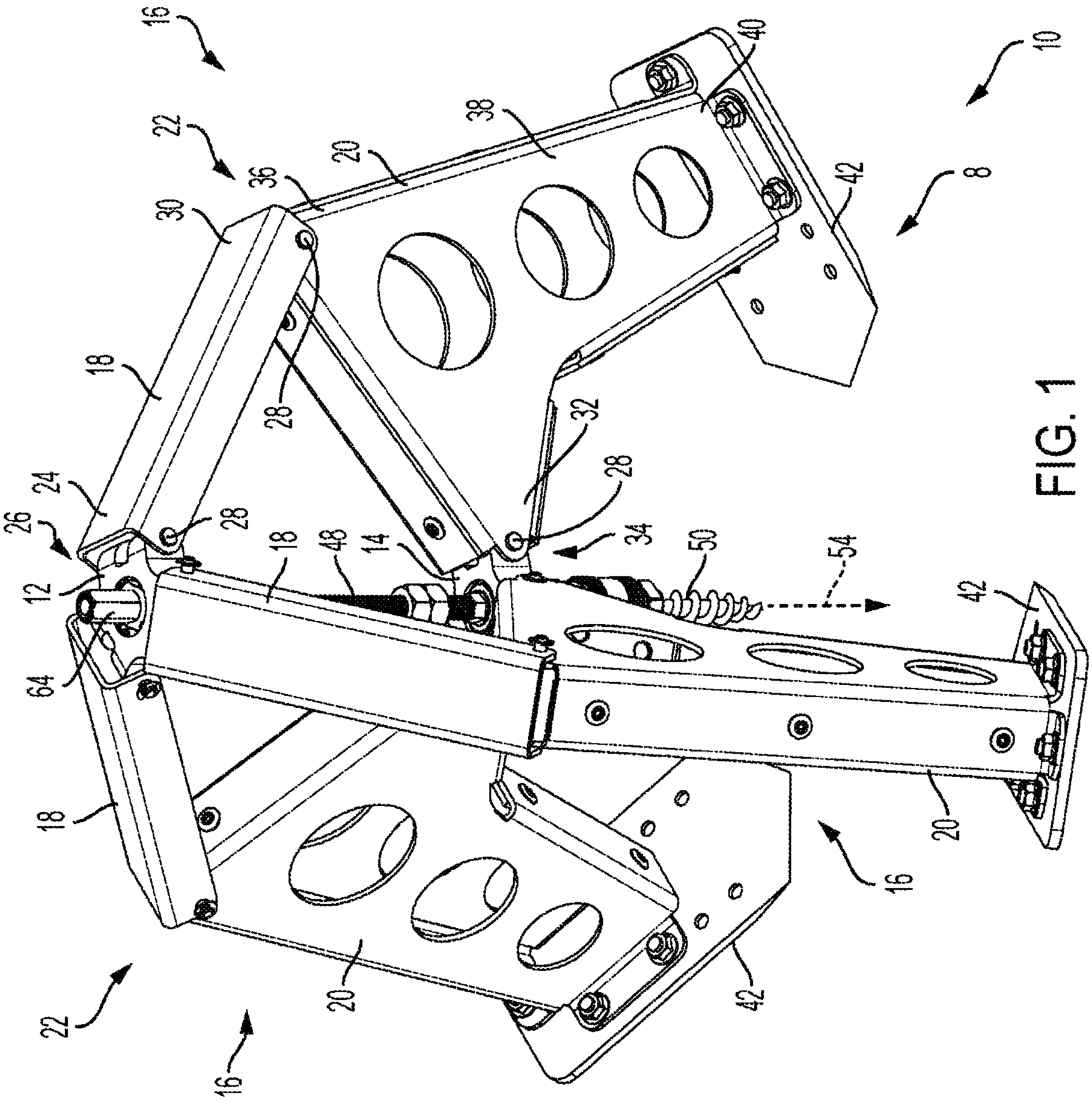


FIG. 1

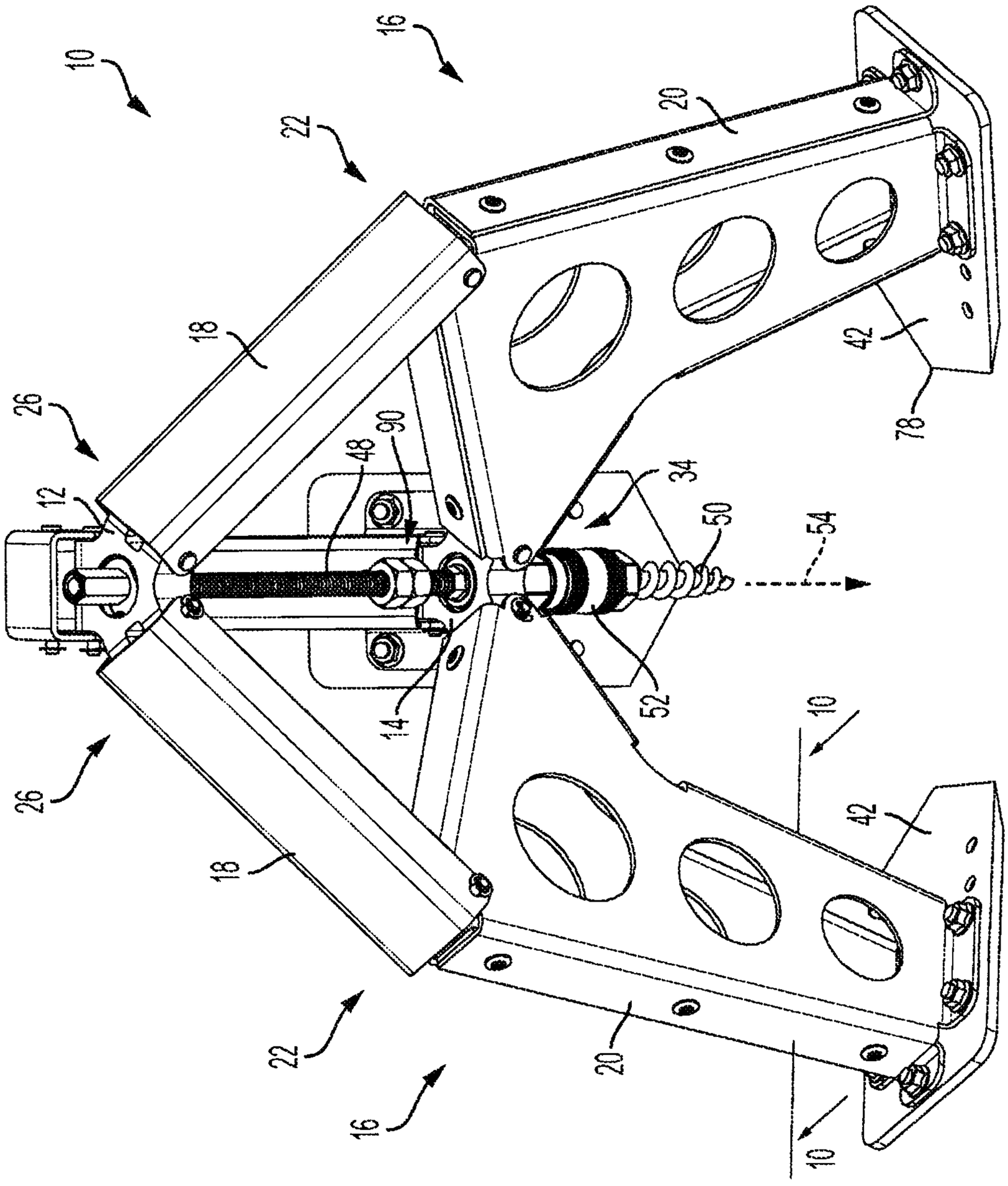


FIG. 2

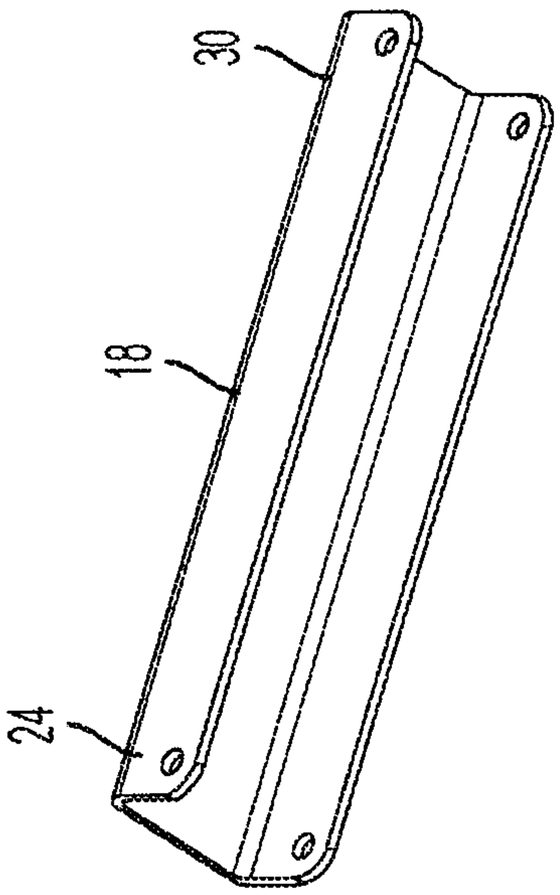


FIG. 4

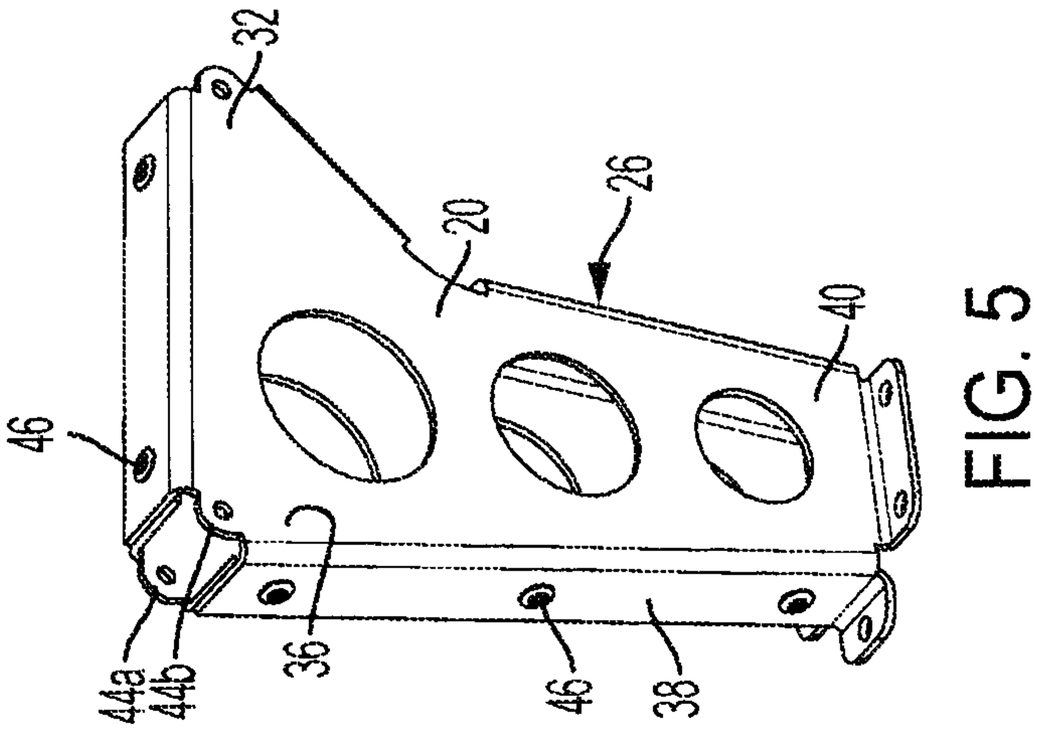


FIG. 5

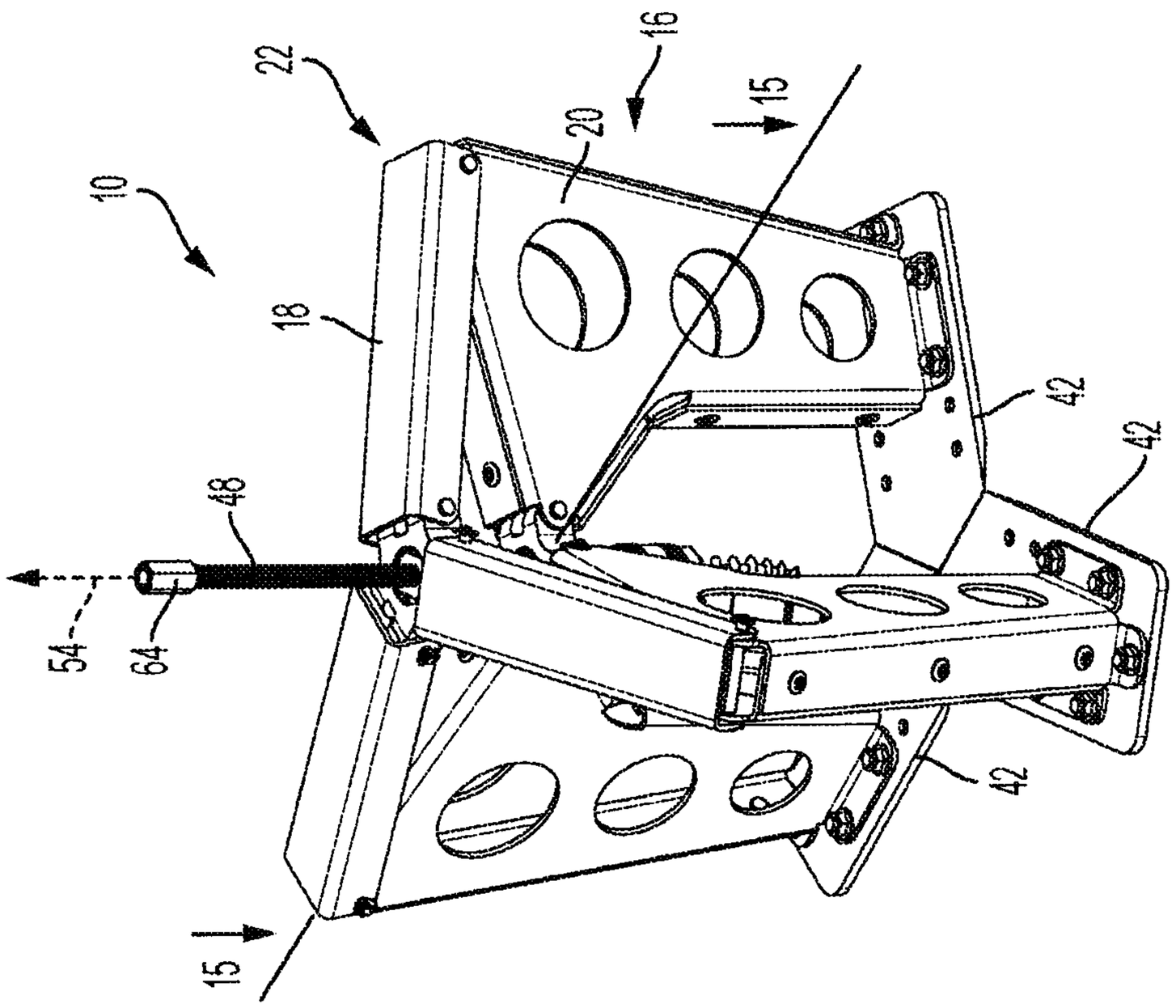


FIG. 3

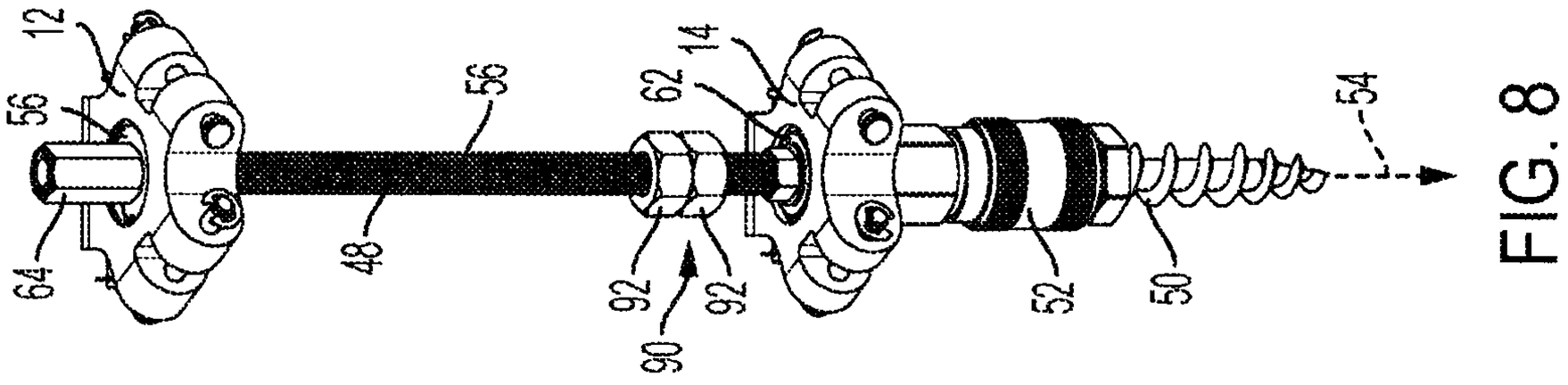


FIG. 8

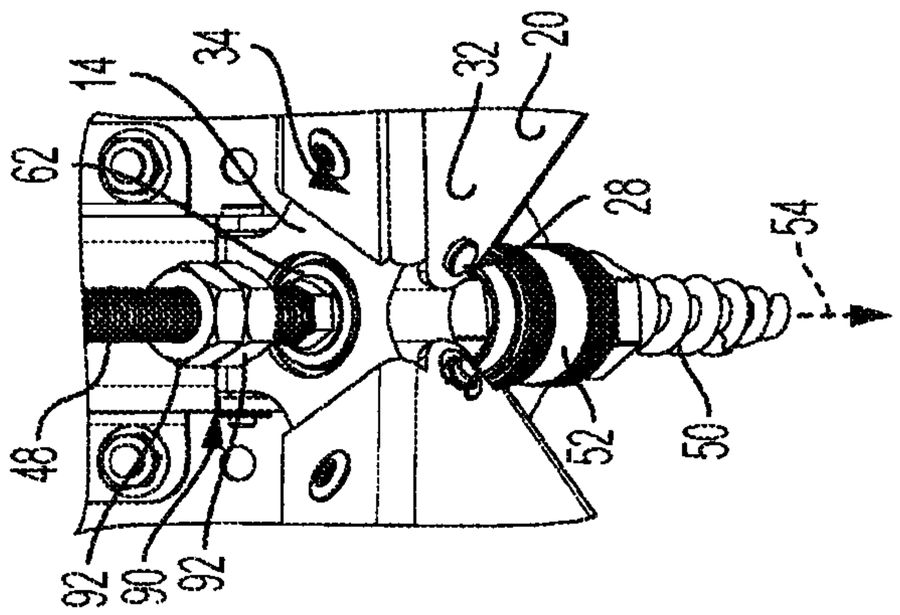


FIG. 7

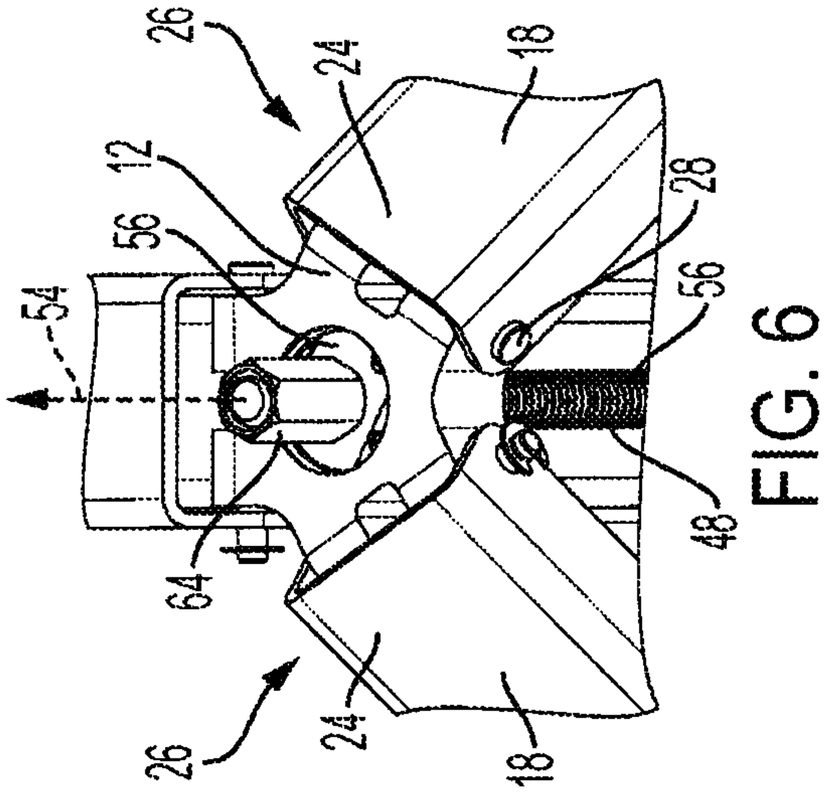


FIG. 6

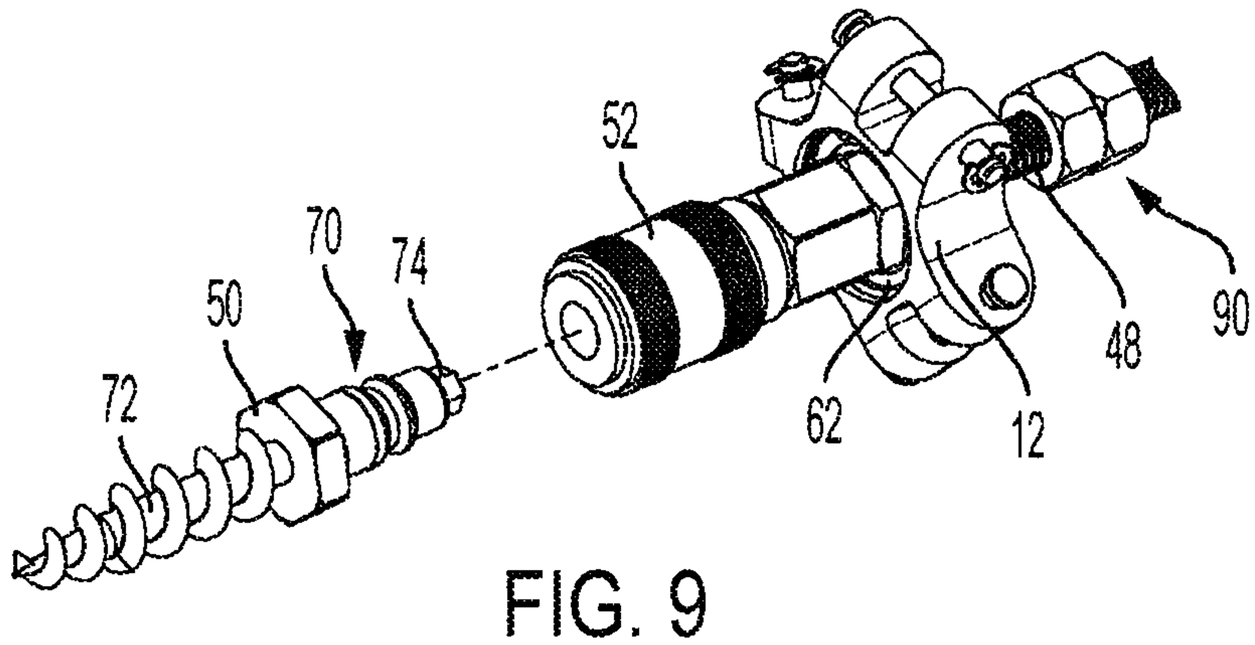

52
70
74
50
72
62
12
48
90

FIG. 9

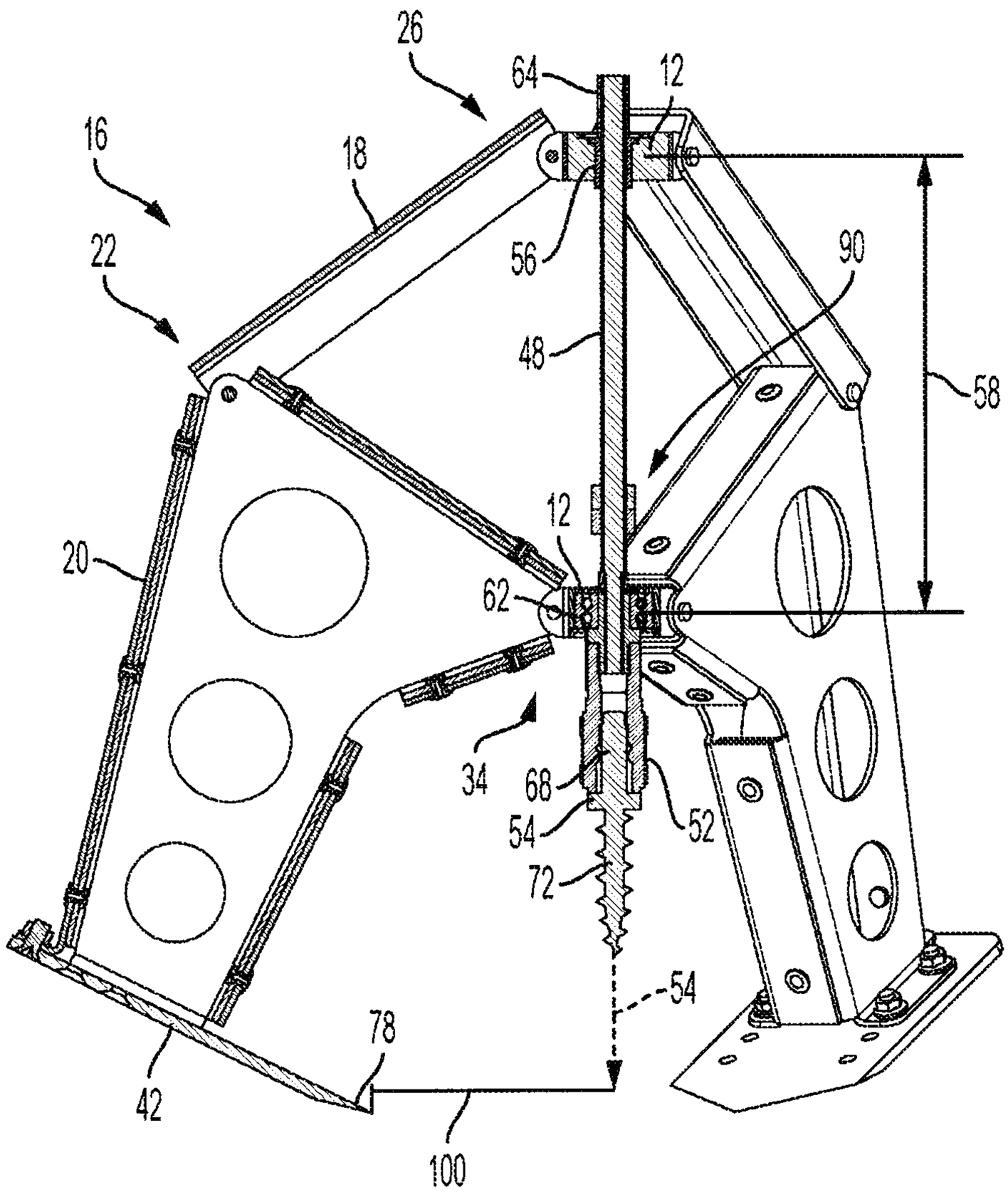

26
64
12
16
18
22
56
90
48
58
20
12
62
34
68
54
52
72
54
78
42
100

FIG. 10

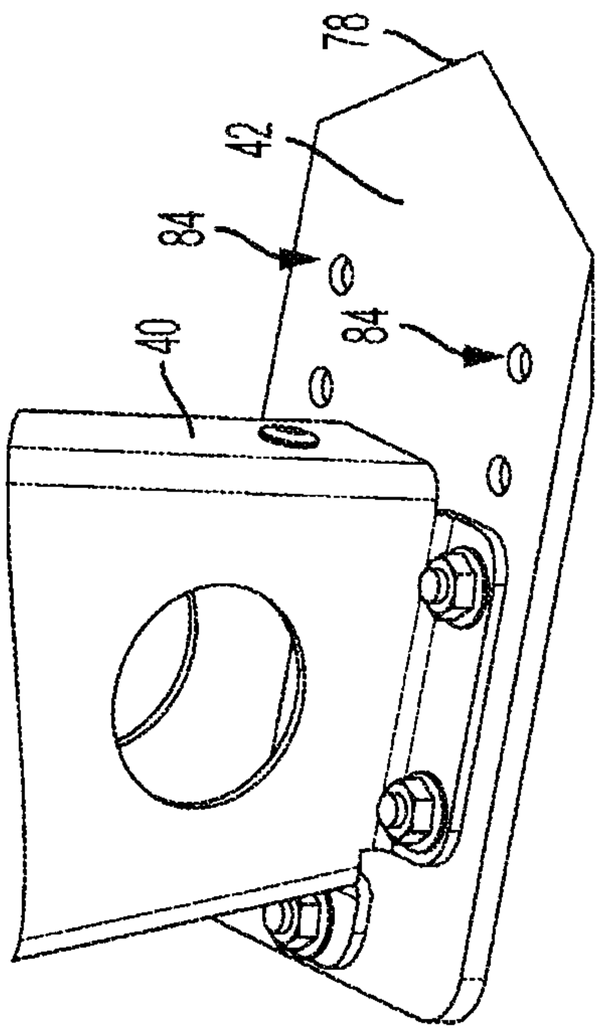


FIG. 12A

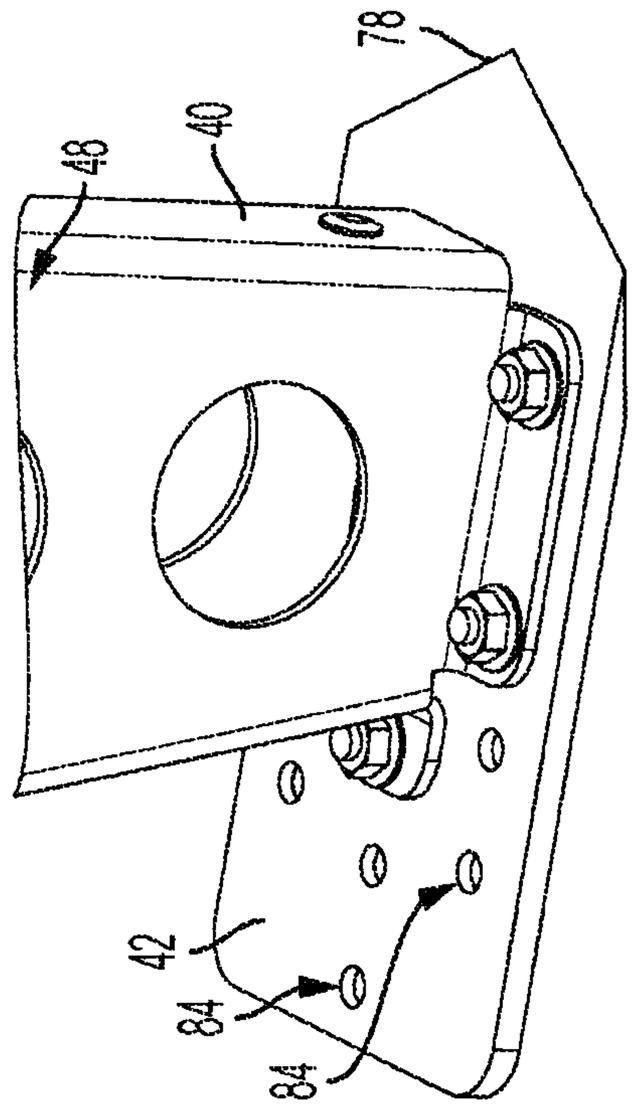


FIG. 12B

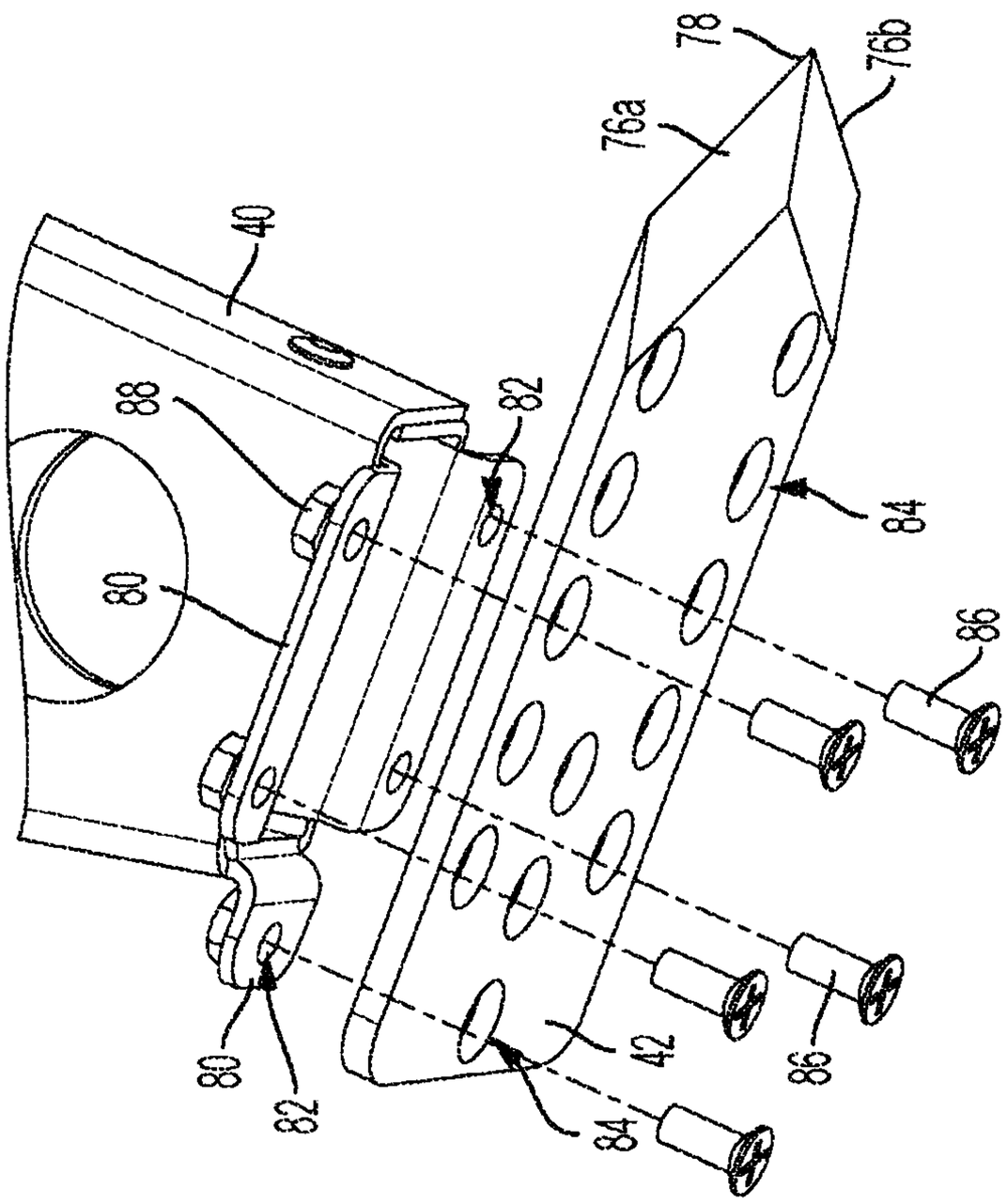


FIG. 11

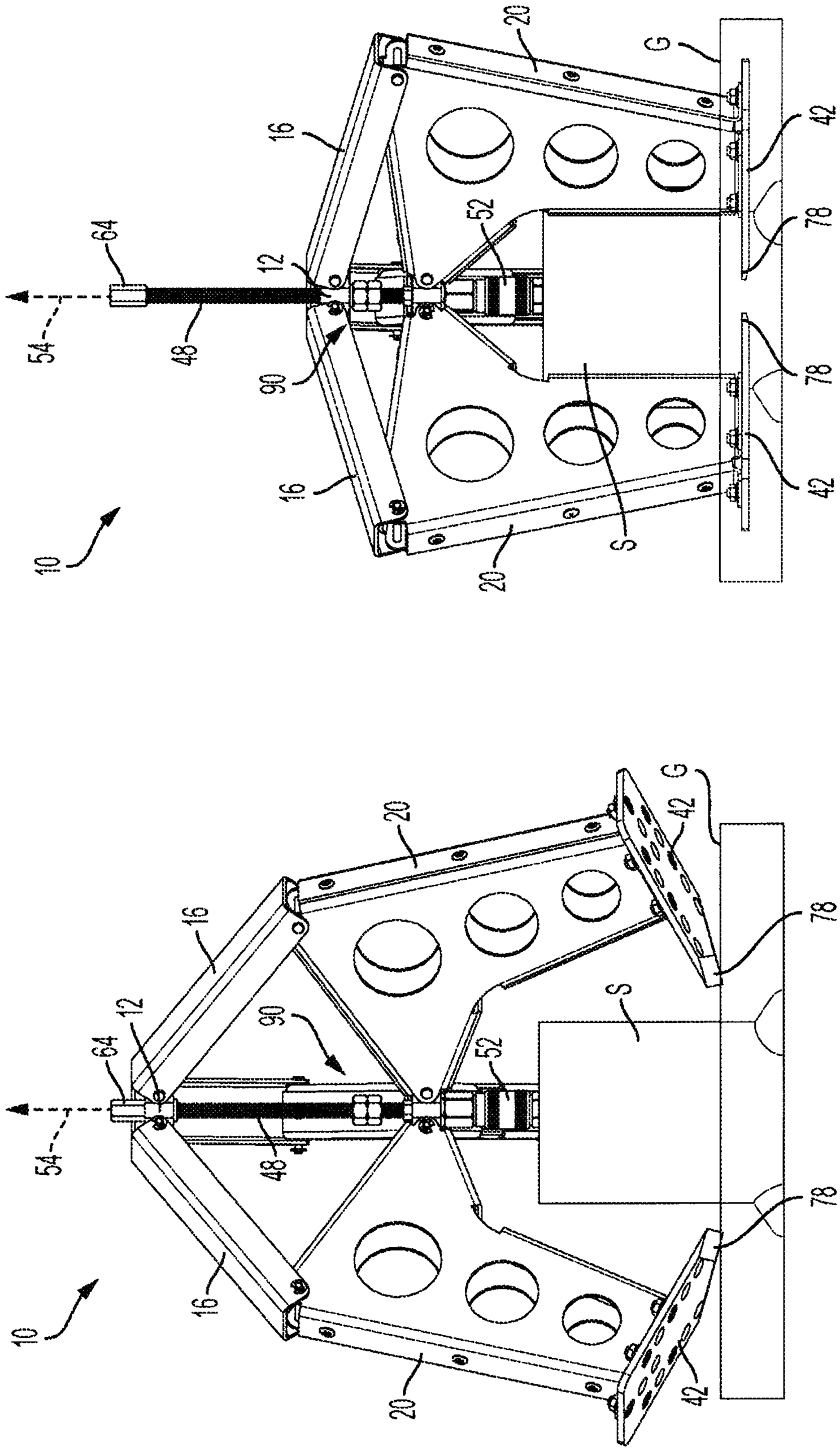


FIG. 13A

FIG. 13B

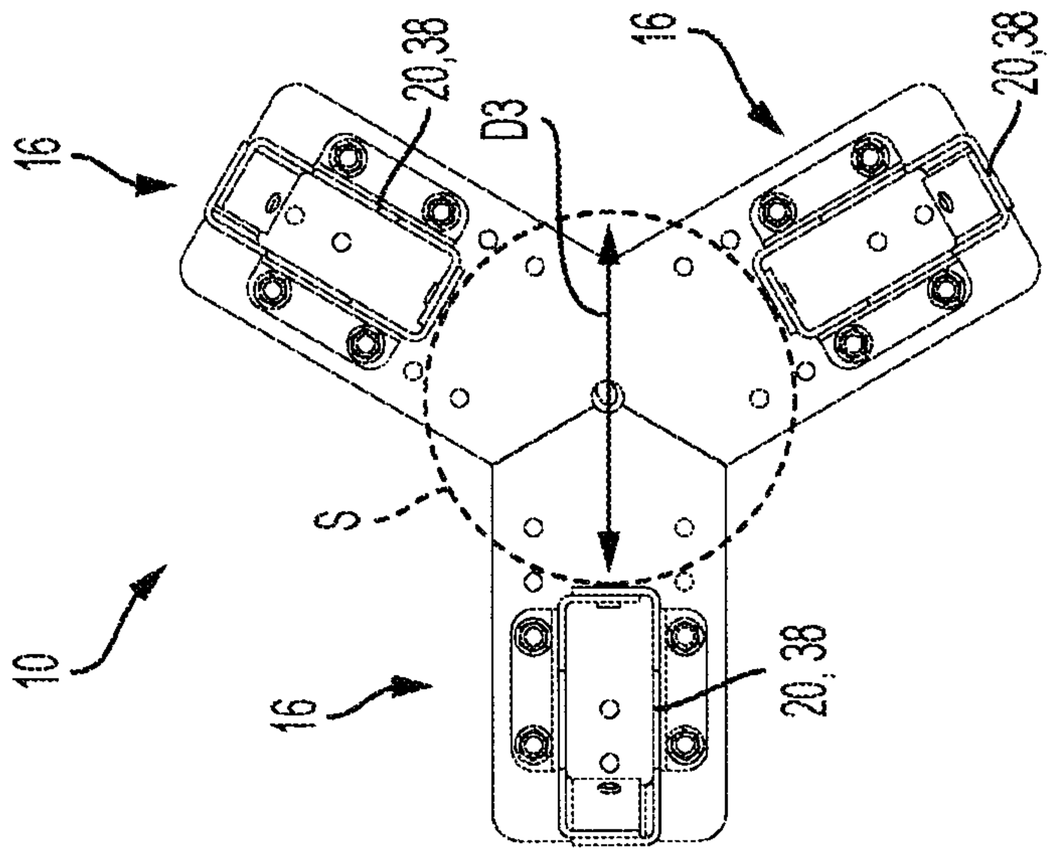


FIG. 15

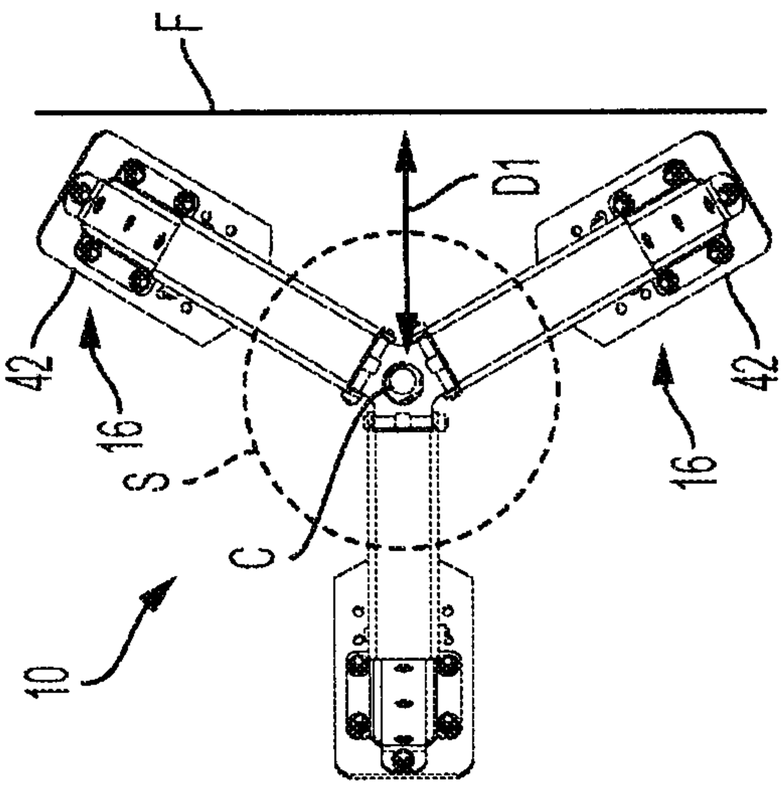


FIG. 14A

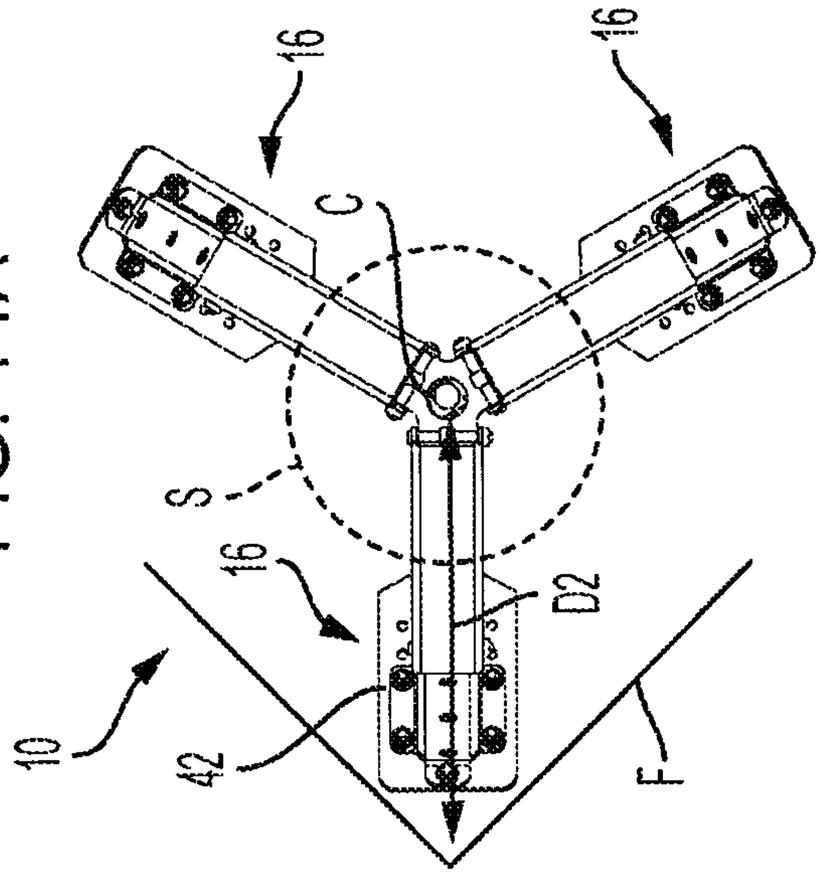


FIG. 14B

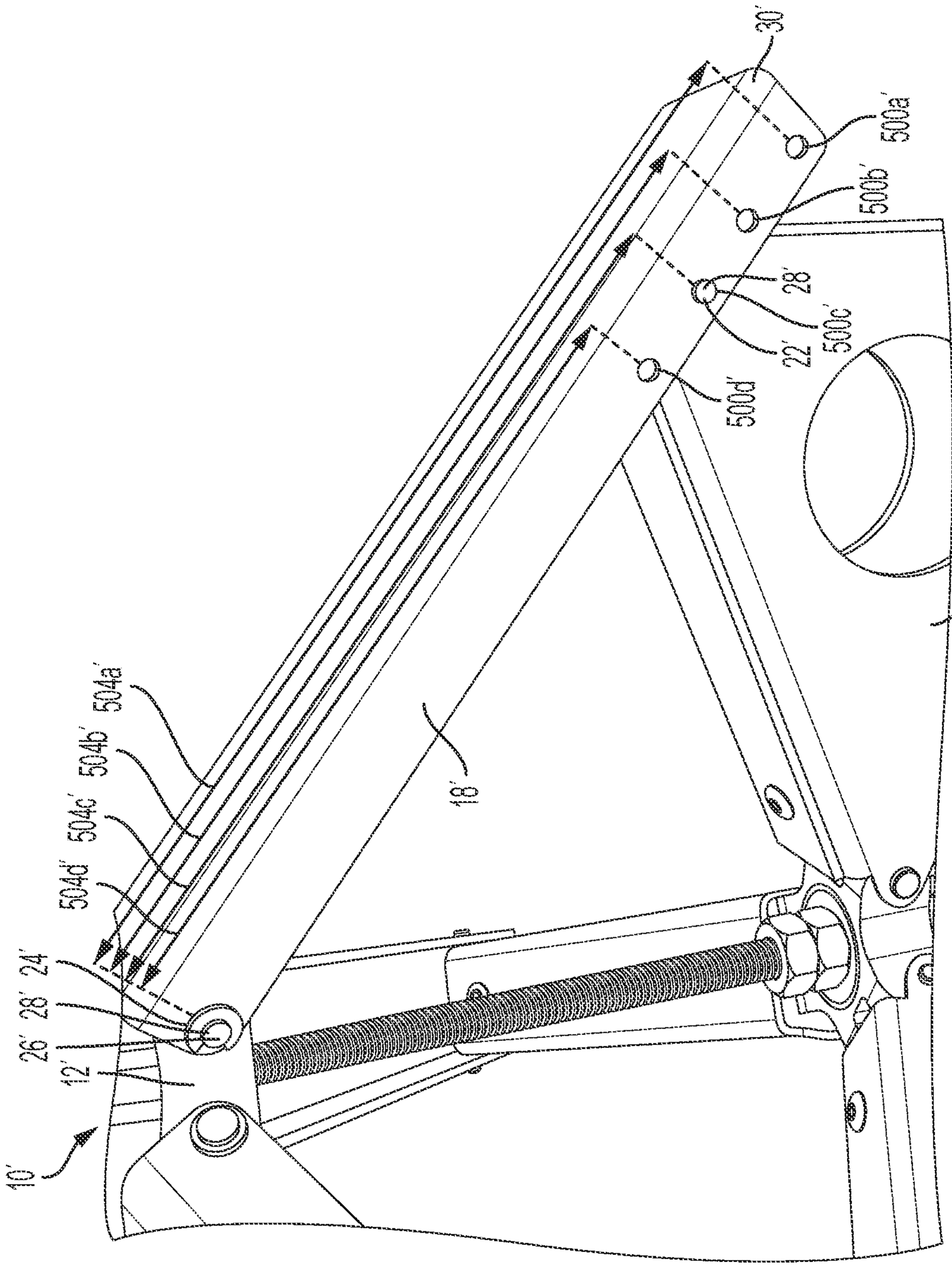

30'
500a'
500b'
28'
22'
500c'
500d'
20'
18'
504c'
504b'
504a'
504d'
24'
28'
26'
12'
10'

FIG. 16

STUMP REMOVER

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims the benefit of and priority to U.S. Provisional Patent Application No. 63/023,613, filed May 12, 2020. The entire contents of which are fully incorporated by reference herein.

FIELD OF THE DISCLOSURE

The present disclosure relates to outdoor tools, and more specifically to a portable tree stump remover.

BACKGROUND OF THE DISCLOSURE

Prior portable tree stump removers that cut, grind, or mill away a stump are typically complicated, large and cumbersome, heavy, and expensive. Wheels are frequently employed to transport the stump remover to a tree stump and to support the stump remover during the cutting process. Many of these removers must be towed to and from a job site.

SUMMARY OF THE DISCLOSURE

In one aspect, a stump removal tool operable to sever a tree stump. The stump removal tool includes an anchor configured to be fixedly secured to the tree stump, and a lead screw extending along a central axis of the stump removal tool and configured to selectively couple to the anchor. The stump removal tool also includes a plurality of arm assemblies coupled to the lead screw, each arm assembly including a blade plate. The lead screw is rotatable to adjust the stump removal tool between an open configuration in which each blade plate is located distant from the central axis, and a closed configuration in which each blade plate is located proximate the central axis.

In another aspect, a stump removal tool operable to sever a tree stump. The stump removal tool includes a lead screw extending along a central axis of the stump removal tool and configured to be coupled to the tree stump. The stump removal tool also includes a first central hub threadably engaged with the lead screw, and a second central hub rotatably coupled to a distal end of the lead screw. The stump removal tool further includes a plurality of arm assemblies pivotably coupled to each of the first central hub and the second central hub, each arm assembly including a blade plate. The lead screw is rotatable to adjust the stump removal tool between an open configuration in which the first central hub is located distant from the second central hub and each blade plate is located distant from the central axis, and a closed configuration in which the first central hub is located proximate the second central hub and each blade plate is located proximate the central axis.

In another aspect, a stump removal tool operable to sever a tree stump. The stump removal tool including an anchor configured to be fixedly secured to the tree stump, a cutting assembly defining a central axis therethrough, where the cutting assembly is removably couplable to the anchor, and where the cutting assembly includes a plurality of arm assemblies each including a blade plate, and where the plurality of arm assemblies are adjustable between an open configuration in which each blade plate is located a first distance from the central axis, and a closed configuration in which each blade plate is located a second distance from the central axis less than the first distance.

In another aspect, a stump removal tool operable to sever a tree stump. The stump removal tool including a lead screw extending along a central axis of the stump removal tool and configured to be coupled to the tree stump, a first central hub coupled to and configured to move axially along the lead screw, a second central hub coupled to and axially fixed relative to the lead screw, where the first central hub and the second central hub define a hub distance therebetween, a plurality of arm assemblies pivotably coupled to each of the first central hub and the second central hub, where each arm assembly including a blade plate, and where each blade plate defines a blade plate distance from the central axis, and where adjusting the hub distance causes at least one blade plate distance to change.

In another aspect, a stump removal tool operable to sever a tree stump. The stump removal tool including an anchor fixedly couplable to the stump, and a cutting assembly adjustable between a closed position and an open position, and where the cutting assembly is removably couplable to the anchor.

Other features and aspects of the disclosure will become apparent by consideration of the following detailed description and accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGS. **1** and **2** are perspective views of a stump removal tool, such as a stump jack, according to one embodiment, with the stump jack set to an open configuration.

FIG. **3** is a perspective view of the stump jack of FIG. **1** set to a closed configuration.

FIG. **4** is a perspective view of an upper arm of the stump jack of FIG. **1**.

FIG. **5** is a perspective view of a lower arm of the stump jack of FIG. **1**.

FIG. **6** is a perspective view of a first central hub of the stump jack of FIG. **1**.

FIG. **7** is a perspective view of a second central hub of the stump jack of FIG. **1**.

FIG. **8** is a perspective view of a lead screw and an anchor of the stump jack of FIG. **1**.

FIG. **9** is a partially exploded perspective view of a quick-release coupler and the anchor of the stump jack of FIG. **1**.

FIG. **10** is a cross-sectional view of the stump jack of FIG. **1**, taken along line **10-10** of FIG. **2**.

FIG. **11** is a partially exploded perspective view of a portion of the stump jack of FIG. **1**.

FIG. **12**A is a perspective view of a portion of the stump jack of FIG. **1**, illustrating a blade plate set to a radially inner position.

FIG. **12**B is another perspective view of a portion of the stump jack of FIG. **1**, illustrating the blade plate set to a radially outer position.

FIG. **13**A is a side view of the stump jack of FIG. **1** set to the open configuration and coupled to a tree stump.

FIG. **13**B is a side view of the stump jack of FIG. **1** set to the closed configuration and coupled to a tree stump.

FIGS. **14**A and **14**B schematically illustrate the stump jack of FIG. **1** positioned adjacent various obstacles.

FIG. **15** is a cross-sectional view of the stump jack of FIG. **1** taken along line **15-15** of FIG. **3**.

FIG. **16** illustrates another embodiment of the stump jack.

Before any embodiments of the disclosure are explained in detail, it is to be understood that the disclosure is not

limited in its application to the details of construction and the arrangement of components set forth in the following description or illustrated in the following drawings. The disclosure is capable of other embodiments and of being practiced or of being carried out in various ways. Also, it is to be understood that the phraseology and terminology used herein is for the purpose of description and should not be regarded as limiting.

DETAILED DESCRIPTION

FIGS. **1** and **2** illustrate an outdoor tool in the form of a stump removal tool or stump jack **10**. The stump jack **10** is operable to remove a stump S that typically remains in the ground after the trunk of a tree, bush, or similar plant has been severed at a location just above the surface of the ground. Specifically, the stump jack **10** is operable to be anchored to the remaining stump S and then sever the stump at a location below the surface of the ground, as will be described below. The stump jack **10** includes an anchor **50** configured to be fixedly coupled to the stump to be severed, and a cutting assembly **8**, couplable to the anchor **50** and adjustable between an open configuration (see FIG. **1**) and a closed configuration (see FIG. **3**) to physically cut the stump S itself. By anchoring the cutting assembly **8** to the stump S via the anchor **50**, the forces generated by and within the stump jack **10** during the cutting process are completely self-contained and/or directed into the stump. As such, no external supports, weights, or ballasts are required (e.g., a heavy truck, etc.).

With reference to FIGS. **8-10**, the anchor **50** of the stump jack **10** is configured to be releasably and fixedly coupled to the end surface of the stump S (e.g., the cut surface) to act as an anchor point for the stump jack **10**. More specifically, the anchor **50** includes a screw portion **72** with wood screw threads configured to enter into and become lodged in the wood of the stump—resisting axial removal therefrom. The anchor **50** also includes a hexagonal head **74** configured to engage a tool (e.g., a wrench, a drill, etc.) to facilitate screwing the anchor **50** into and out of the stump. While a "screw" style anchor **50** is shown, it is understood that alternative forms of connection (e.g., adhesive, nails, grasping elements, and the like) may also be used.

The anchor **50** also includes a coupler portion **68** extending therefrom and configured to be releasably coupled to the cutting assembly **8**. More specifically, the coupler **68** includes a male coupler configured to engage a female coupler **52** (described below) of the cutting assembly **8**. In the illustrated embodiment, the male coupler **68** is shaped similar to a male pneumatic connection tip.

The cutting assembly **8** of the stump jack **10** includes a lead screw **48** defining a central axis **54**, a first central hub **12** coupled to the lead screw **48**, and a second central hub **14** coupled to the lead screw **48** to define a hub distance **58** between itself and the first central hub **12** (see FIG. **9**). The cutting assembly **8** also includes a plurality of arm assemblies or jaws **16** each pivotably coupled to both of the first and second central hubs **12**, **14**, and a plurality of blade plates **42** coupled to a respective one of the plurality of arm assemblies **16** to move together therewith. During use, the movement of the first and second hubs **12**, **14** relative to one another (e.g., changes in the hub distance **58**) cause the arm assemblies **16** to move between the open configuration (see FIG. **1**), in which the blade plates **42** are spaced a first radial distance from the central axis **54**, and the closed configuration (see FIG. **3**), in which the blade plates **42** are spaced a second radial distance from the central axis **54** that is less than the first radial distance. Generally speaking, moving the arm assemblies **16** from the open position to the closed position produces the stump cutting action (described below).

With reference to FIGS. **6-8**, the lead screw **48** of the cutting assembly **8** is an elongated threaded rod having a proximal or first end **66** and a distal or second end **60** opposite the proximal end **66**. In the illustrated embodiment the lead screw **48** is at least partially threaded. More specifically, the lead screw **48** includes ACME threads **56** along at least a portion of the axial length thereof configured to threadably engage with corresponding threads of the central hub **12**. As such, rotation of the lead screw **48** about the central axis **54** causes the first central hub **12** to move axially along the length of the lead screw **48**. While the illustrated first central hub **12** includes a nut captured within the body of the central hub **12**, it is understood that in alternative embodiments the corresponding threads may be formed integrally into the body of the hub **12**.

The distal end **60** of the lead screw **48** is supported by a bearing **62** that is fixedly retained within the second central hub **14** (see FIG. **9**). The bearing **62** permits the lead screw **48** to rotate relative to the second central hub **14** but does not permit the second central hub **14** to translate axially along the length of the lead screw **48** (e.g., the second central hub **14** is axially fixed relative to the lead screw **48**). Accordingly, when the lead screw **48** is rotated, the first central hub **12** travels along the length of the lead screw **48** (as described above) while the second central hub **14** remains fixed relative to the lead screw **48**. As such, rotating the lead screw **48** causes the first and second central hubs **12**, **14** to move toward or away from each other (e.g., causing the hub distance **58** to decrease and increase, respectively).

The proximal end **66** of the lead screw **48** further includes a hexagonal head **64**. The hexagonal head **64** is configured to engage a tool, such as a hand tool (e.g., a wrench, a socket, etc.) or a power tool (e.g., a drill and socket, pneumatic driver, etc.), whereby the lead screw **48** can be rotated about the central axis **54** to operate the stump jack **10**. For example, the stump jack **10** can be conveniently operated with a cordless drill (e.g., a drill driver, an impact driver, etc.) by engaging the hexagonal head **64** with a socket coupled to the drill, and rapidly turning the lead screw **48**.

With reference to FIGS. **8-10**, the lead screw **48** also includes a quick-release coupler **52** affixed to the distal end **60** thereof and configured to quickly engage or release from the anchor **50**. In the illustrated embodiment, the quick-release coupler **52** comprises a female coupler of the type similar to those traditionally employed in pneumatic hose connections (i.e., having a detent member movable between radially inward and radially outward positions), and configured to compliment the male coupler portion **68** of the anchor **50** (described above). The resulting connection between the coupler **52** of the lead screw **48** and the coupler portion **68** of the anchor **50** is configured to permit the lead screw **48** to rotate relative to the anchor **50** but restrict relative axial movement therebetween. As such, the connection permits the user to rotate the lead screw **48** without transmitting rotational forces to the anchor **50** while still allowing axial forces to be transmitted into the stump S itself.

While the illustrated embodiment includes a male connection associated with the anchor **50** and a female connector associated with the lead screw **48**, it is understood that in alternative embodiments the components can be reversed.

With reference to FIGS. **1** and **2**, each arm assembly **16** includes an elongated upper bracket or upper arm **18**, and a

generally L-shaped lower bracket or lower arm **20** pivotably coupled to the upper arm **18** at a heel joint **22**. The upper arm **18** includes a first end **24** hingedly connected to the first central hub **12** at an upper joint **26** (e.g., via a clevis pin **28**), and a second end **30** spaced apart from the first end **24** and hingedly connected to the L-shaped lower arm **20** at the heel joint **22** (e.g., via a clevis pin **28**). With reference to FIG. **4**, in the illustrated embodiment, each upper arm **18** comprises a U-channel formed from a folded piece of sheet material (e.g., steel). However, in alternative embodiments the upper arm **18** may be cast, formed from structural steel, and the like.

Referring again to FIGS. **1** and **2**, the lower arm **20** is substantially "L" shaped and includes a toe portion **32** hingedly connected to the second central hub **14** at a toe joint **34** (e.g., via a clevis pin **28**), a heel portion **36** spaced apart from the toe portion **32** and hingedly connected to the upper arm **18** at the heel joint **22**, and a leg portion **38** that extends generally away from the toe and heel portions **32**, **36** to form a distal end or foot portion **40**. The distal end **40**, in turn, supports the blade plate **42** (described below). With reference to FIG. **5**, in the illustrated embodiment, each lower arm **20** comprises two separate folded members **44***a*, **44***b* (e.g., stamped steel) affixed to one another (e.g., via rivets **46**). However, in alternative embodiments the each lower arm **20** may be formed as a single unit, cast, forged, and the like.

In the illustrated embodiment, the arm assemblies **16** of the cutting assembly **8** are angularly spaced from one another at equal intervals about the central hubs **12**, **14** (e.g., relative to the central axis **54**). However, while the illustrated embodiment includes three arm assemblies **16** each spaced at equal intervals apart, it is understood that in alternative embodiments more or fewer arm assemblies **16** may be present. In still other embodiments, the arm assemblies **16** may be spaced an uneven intervals.

With reference to FIGS. **11**-**12**B, each blade plate **42** of the cutting assembly **8** is coupled to a corresponding arm assembly **16** and includes sharpened forward edges **76***a*, **76***b* that extend to meet at a forward tip **78**. When installed on a corresponding arm assembly **16**, each blade plate **42** also defines a blade plate distance **100** generally defined as the radial distance between the forward tip **78** and the central axis **54**.

During use, each blade plate **42** moves together with its corresponding arm assembly **16** and is configured to physically cut the material of the corresponding stump S. In the illustrated embodiment, the foot portion **40** of each lower arm **20** includes flanges **80** with first apertures **82** that correspond to second apertures **84** formed in the corresponding blade plate **42**. Screws **86** extend through the first and second apertures **82**, **84** and tighten to nuts **88** to couple the blade plate **42** to the foot portion **40**. Each blade plate **42** includes more second apertures **84** than there are first apertures **82**, thus allowing the position of the blade plate **42** to be adjusted between radially inward and radially outward positions (i.e., along a direction generally toward or away from the central axis **54**). Specifically, the position of the blade plate **42** is adjusted by removing the screws **86** and re-aligning the first apertures **82** with others of the second apertures **84**, and then re-inserting and tightening the screws **86**. For example, FIG. **12**A illustrates the blade plate **42** adjusted to a radially innermost position, while FIG. **12**B illustrates the blade plate **42** adjusted to a radially outermost position. In other embodiments (not shown), other adjustable means may be utilized to secure the blade plate **42** to the foot portion **40** that do not require tools to perform adjustments (e.g., a hand-operated bayonet lock connection). In other embodiments, not shown, the individual apertures **84** may be replaced by elongated slots to allow for continuous adjustment. In still other embodiments, other forms of connection between the blade plate **42** and arm assembly **16** may be used. In still other embodiments, the blade plate **42** may be integrally formed with a portion of the arm assembly **16**. Still further, while the illustrated blade plates **42** include two sets of apertures corresponding with two relative positions, it is understood that additional sets of apertures may be included to corresponding with still other positions. Still further, while the illustrated apertures adjust the radial position of the plate **42** relative to the arm assemblies **16**, in alternative embodiments additional degrees of freedom—translative and rotational—may be included.

Referring again to FIGS. **1** and **2**, the jaw assembly **8** is illustrated in an open configuration with the lead screw **48** fully loosened such that the first central hub **12** is relatively distant from the second central hub **14** and located adjacent the hexagonal head **64**. In the open configuration, the blade plates **42** are positioned relatively far apart from one another and from the central axis **54** (e.g., the first and second central hubs **12**, **14** produce a first hub distance). FIG. **3** illustrates the stump jack **10** in a closed configuration with the lead screw **48** tightened such that the first central hub **12** is relatively close to the second central hub **14** and relatively distant from the hexagonal head **64**. In the closed configuration, the blade plates **42** are converged toward one another such that the forward tips **78** generally meet at the central axis **54** (e.g., the first and second hubs **12**, **14** produce a second hub distance **58***b* that is less than the first hub distance **58***a*).

To prevent the stump jack **10** from being over-tightened in the closed configuration shown in FIG. **3**, which could cause the forward edges **76***a*, **76***b* to bind against one another and become dull, the stump jack **10** further includes a stop member **90** (FIG. **2**) positioned on the lead screw **48**. In the illustrated embodiment, the stop member **90** comprises two nuts **92** threaded to the lead screw **48** and tightened against one another. The stop member **90** is located at a position along the length of the lead screw **48** corresponding to a fully converged position of the blade plates **42** (FIG. **3**). In other words, as the lead screw **48** is tightened, the stop member **90** will contact and engage the first central hub **12** when the blade plates **42** reach the fully converged position, to prevent further tightening of the lead screw **48**. The position of the stop member **90** is adjustable along the length of the lead screw **48** to account for adjustment of the positions of the blade plates **42**, or to generally adjust the closed configuration as desired.

With reference to FIGS. **13**A and **13**B, operation of the stump jack **10** will now be described. The jaw assembly **8** is adjusted to the open configuration as shown in FIG. **13**A by rotating the lead screw **48** to separate the first central hub **12** from the second central hub **14** until a first hub distance is produced. Furthermore, the anchor **50** (FIG. **9**) is detached from the lead screw **48** by actuating the quick-release coupler **52** to release the coupler portion **68**.

With the parts separated, the anchor **50** is then screwed into a central region (e.g., into the cut or end surface) of the stump S that is to be removed (e.g., by engaging the hexagonal head **74** with a drill and socket to rotate the anchor **50** as discussed above). Once the anchor **50** is secured to the stump S, the cutting assembly **8** is lowered about the stump S with the blade plates **42** surrounding the stump S. The anchor **50** is then re-attached to the lead screw **48** via the quick-release coupler **52**.

With the items attached, the lead screw **48** is then tightened (e.g., by engaging the hexagonal head **64** with the drill and socket and rotating the lead screw **48** in the manner described above), causing the first central hub **12** to travel axially along the lead screw **48** toward the second central hub **14**. The resulting relative motion of the hubs **12**, **14** cause the hub distance **58** to decrease which, in turn, causes the blade plate distance **100** to decrease and the stump jack **10** to move toward the closed configuration (FIG. **3**). More specifically, as the lead screw **48** is tightened, the anchor **50** anchors the second central hub **14** relative to the stump S (e.g., exerting any external forces from the jaw assembly **8** into the stump S), and the first central hub **12** travels toward the second central hub **14**. The lower arms **20** pivot relative to the second central hub **14** about the toe joint **34** (FIG. **10**), causing the blade plates **42** to swing toward the stump S and converge toward the central axis **54**. As the blade plates **42** swing toward the central axis **54**, the blade plates **42** cut into the stump S to sever the stump S at a location below the surface of the surrounding ground G. When the forward tips **78** of the blade plates **42** reach the central axis **54**, the stop member **90** engages the first central hub **12** to prevent further tightening of the lead screw **48**.

With the cutting complete, the severed stump S and stump jack **10** may be removed from the ground G together as a unit with the stump jack **10** acting as a more easily accessible connection point. More specifically, the stump jack **10** may include a connection point (e.g., a ring, aperture, clip, and the like) to allow the user to hook the stump jack **10** up a winch, truck, rope, or the like to assist with removal.

With the project complete, the stump jack **10** can then be removed from the stump S by loosening the lead screw **48** (e.g., by reversing the direction of rotation of the drill and socket), causing the blade plates **42** to back out of the stump S. The anchor **50** is then detached from the quick-release coupler **52** and unscrewed from the stump S.

In some instances, a user may desire to remove a relatively hard stump (e.g., left from a hardwood tree) that requires relatively greater cutting force to sever. In such instances, the user can remove the stump in two or more sequences by setting the blade plates **42** to the radially outward position (FIG. **12**A) and performing a first cut, and then adjusting the blade plates **42** to the radially inward position (FIG. **12**B) and performing a second cut.

With reference to FIGS. **14**A and **14**B, the relatively compact geometry of the stump jack **10** allows a user to remove stumps S even when obstacles such as fences F are located close by. For example, FIG. **14**A illustrates a stump S located proximate to a straight section of a fence F. By orienting the stump jack **10** with two of the arm assemblies **16** equidistant from the fence F, the stump jack **10** can remove the stump S when a center point C of the stump S is located a minimum distance D**1** from the fence F. For the illustrated stump jack **10**, the minimum distance D**1** is approximately 8 inches. In other embodiments, the stump jack may be scaled down such that the minimum distance D**1** is less than 8 inches (e.g., the minimum distance D**1** may be approximately 5 inches). Similarly, FIG. **14**B illustrates the stump S located proximate to a 90 degree corner of a fence F. By orienting the stump jack **10** with one of the arm assemblies **16** nearest to the corner of the fence F, the stump jack **10** can remove the stump S when the center point C of the stump S is located a minimum distance D**2** from the corner of the fence F. For the illustrated stump jack **10**, the minimum distance D**2** is approximately 14 inches. In other embodiments, the stump jack may be scaled down for use with relatively smaller stumps, such that the minimum distance D**2** may be less than 14 inches (e.g., the minimum distance D**2** may be approximately 10 inches).

With reference to FIG. **15**, when the stump jack **10** is set to the closed configuration and the blade plates **42** are located in the radially inward position (FIG. **12**B), the leg portions **38** of the lower arms **20** delimit a maximum diameter D**3** of a stump S that can be removed with the stump jack **10**. In the illustrated embodiment, the maximum diameter D**3** is approximately 7 inches. In other embodiments, the maximum diameter D**3** may be greater than or less than 7 inches (e.g., D**3** may be between 1 inch and 12 inches). In further embodiments, the maximum diameter D**3** may be greater than 12 inches, depending on the tree type.

FIG. **16** illustrates another embodiment of the stump jack **10'**. The stump jack **10'** is substantially similar to the stump jack **10** so only the differences will be described herein. The stump jack **10'** includes an elongated upper bracket or upper arm **18'** with a variable effective length (e.g., the distance between the first end **24'** and the mounting point **500'** currently in use). The upper arm **18'** includes a first end **24'** hingedly connected to the first central hub **12'** at an upper joint **26'** (e.g., via a clevis pin **28'**), and a second end **30'** opposite from and spaced apart from the first end **24'**.

As shown in FIG. **16**, the second end **30'** of the upper arm **18'** includes a plurality of longitudinally spaced mounting points **500***a*'-d', each spaced a unique distance from the first end **24'**. During use, each mounting point **500***a*'-d' may be selectively coupled to the lower arm **20'** at the heel joint **22'** (e.g., via a clevis pin **28'**) thereby establishing a unique effective length **504***a*'-d' of the upper arm **18'**. In the illustrated embodiment, the user may select one of the plurality of mounting points **500***a*'-d' by removing and re-inserting the clevis pin **28'** through the appropriate mounting point **500***a*'-d'.

During use, changing the mounting point **500***a*'-d' to which the lower arm **20'** is attached (e.g., the location of the heel joint **22'**) alters the effective length **504***a*'-d' of the upper arm **18'** and, therefore, allows the user to adjust the operating range and torque application of the lower arm **20'** during use. More specifically, for a given operating range of hub distances **58'** (e.g., from the fully open position to the closed position), the longer the effective length **504***a*'-d' the lesser the operating range (e.g., the difference between largest and smallest possible blade plate distance **100**) of the stump jack **10'** and the lesser the maximum blade plate distance **100** the stump jack **10'** can produce for a given blade plate mounting location. Furthermore, the longer the effective length **504***a*'-d' the greater the mechanical advantage provided (e.g., the stump jack **10'** applies a greater force via the blade plate **42** for a given input torque to the lead screw **42**). In contrast, shortening the effective length **504***a*'-d' increases the operating range, increases the maximum blade plate distance **100** the stump jack **10'** can produce, and decreases the mechanical advantage provided by the stump jack **10'**.

For example, with the lower arm **20'** attached at the first mounting point **500***a*', the upper arm **18'** has a first effective length **504***a*' which produces a first operating range and first maximum plate distance. In contrast, with the lower **20'** attached at the second mounting point **500***b*', the upper arm **18** has a second effective length **504***b*' that is less than the first effective length **504***a*'. As such, the second mounting point **500***b*' also produces a second operating range greater than the first operating range and a second maximum plate distance that is greater than the first maximum place distance. Furthermore, the second mounting point **500***b*' produces a second average mechanical advantage over the

operating range that is less than the first average mechanical advantage produced over the same operating range as the first mounting point **500***a'*.

Although the disclosure has been described in detail with reference to certain preferred embodiments, variations and modifications exist within the scope and spirit of one or more independent aspects of the disclosure as described.

The invention claimed is:

1. A stump removal tool operable to sever a tree stump, the stump removal tool comprising:

an anchor configured to be fixedly secured to the tree stump;

a cutting assembly defining a central axis therethrough, wherein the cutting assembly is removably couplable to the anchor, and wherein the cutting assembly includes a plurality of arm assemblies each including a blade plate; and

wherein the plurality of arm assemblies are adjustable between an open configuration in which each blade plate is located a first distance from the central axis, and a closed configuration in which each blade plate is located a second distance from the central axis less than the first distance, and

wherein the cutting assembly further includes a lead screw co-axial with the central axis.

2. The stump removal tool of claim **1**, wherein rotating the lead screw about the central axis causes the plurality of arm assemblies to adjust between the open and closed configurations.

3. The stump removal tool of claim **1**, wherein the lead screw is removably couplable to the anchor.

4. The stump removal tool of claim **3**, wherein the lead screw is removably couplable to the anchor so that when the lead screw is coupled to the anchor the lead screw may rotate relative to the anchor but is axially fixed relative to the anchor.

5. The stump removal tool of claim **1**, wherein the anchor includes a screw portion.

6. The stump removal tool of claim **1**, wherein the cutting assembly further includes a first central hub movable axially along the lead screw and a second central hub axially fixed relative to the lead screw.

7. The stump removal tool of claim **6**, wherein the first central hub and the second central hub define a hub distance therebetween, and wherein changing the hub distance causes the plurality of arm assemblies to adjust between the open configuration and the closed configuration.

8. A stump removal tool operable to sever a tree stump, the stump removal tool comprising:

a lead screw extending along a central axis of the stump removal tool and configured to be coupled to the tree stump;

a first central hub coupled to and configured to move axially along the lead screw;

a second central hub coupled to and axially fixed relative to the lead screw, wherein the first central hub and the second central hub define a hub distance therebetween;

a plurality of arm assemblies pivotably coupled the first central hub and pivotably coupled to the second central hub, wherein each arm assembly including a blade plate, and wherein each blade plate defines a blade plate distance from the central axis; and

wherein adjusting the hub distance causes at least one blade plate distance to change.

9. The stump removal tool of claim **8**, wherein adjusting the hub distance causes all of the blade plate distances to change.

10. The stump removal tool of claim **8**, wherein increasing the hub distance causes at least one blade plate distance to increase.

11. The stump removal tool of claim **8**, further comprising an anchor removably couplable to the tree stump, and wherein the lead screw is couplable to the tree stump via the anchor.

12. The stump removal tool of claim **11**, wherein the lead screw is coupled to the anchor so that the lead screw may rotate relative to the anchor but is axially fixed relatively to the anchor.

13. The stump removal tool of claim **8**, wherein the first central hub is threadably coupled to the lead screw.

14. The stump removal tool of claim **8**, wherein each arm assembly includes a first arm and a second arm pivotably coupled to the first arm.

15. The stump removal tool of claim **14**, wherein the first arm is pivotably coupled to the first central hub and wherein the second arm is pivotably coupled to the second central hub.

16. The stump removal tool of claim **8**, wherein at least one blade plate is adjustably coupled to a corresponding arm assembly.

17. A stump removal tool operable to sever a tree stump, the stump removal tool comprising:

an anchor fixedly couplable to the stump; and

a cutting assembly adjustable between a closed position and an open position, and wherein the cutting assembly is removably couplable to the anchor, and

wherein the cutting assembly includes a lead screw defining an axis, and wherein the lead screw is coupled to the anchor so that the lead screw may rotate relative to the anchor but is axially fixed relatively to the anchor.

18. The stump removal tool of claim **17**, wherein the cutting assembly includes one or more arm assemblies.

19. The stump removal tool of claim **1**, wherein the anchor defines an anchor axis, and wherein the anchor axis is co-axial with the central axis.

20. The stump removal tool of claim **8**, wherein each arm assembly produces a first mechanical advantage between the lead screw and the blade plate, and wherein the first mechanical advantage is adjustable.

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